REMARKS

This paper is filed as a supplement to the Response filed on May 27, 2008. Please consider the following remarks in conjunction with the previously filed response.

The obviousness rejections asserted against claims 63, 68, 74, 79, 89, and 90 are further traversed for the reasons presented below. Claims 63, 74, 89, and 90 recite the use of R-410A in a direct exchange geothermal heat exchange system, while claims 68 and 79 recite a refrigerant having operational working pressures between 80 and 405 psi. The combination of Wiggs and Aoyagi is improper and fails to disclose or suggest these elements of the claims.

More specifically, while Aoyagi discloses the use of R-410A refrigerant in an air heat exchanger system, it teaches parameters on the use of the R-410A refrigerant such that it will behave in a manner similar to R-22, and therefore teaches away from the use of R-410A in a direct expansion geothermal heat exchange system.

First, Aoyagi does not identify the higher operating pressures but instead emphasizes that the density of the refrigerant used in its air heat exchanger system is of primary importance. In no less than three instances (namely, Column 5, line 62 to Column 6, line 3; Column 6, lines 45 to 53; and Column 7, lines 28 -37), Aoyagi teaches that refrigerants with greater densities than R-22 are preferred in his air heat exchanger system. Significantly, and to the best of Applicant's knowledge, the density of refrigerant has no bearing on its operational pressures, which instead depend on other factors such as refrigerant charge amounts. Aoyagi, however, expressly teaches using a lower refrigerant charge (which inevitably will lower system operational pressures) when the refrigerant has a density greater than R-22. According to Aoyagi, R-410A is denser than R-22, and therefore Aoyagi teaches that a lower charge (and hence operational pressure) is to be used with that refrigerant (see Column 3, lines 44 - 47, and see column 4, lines 16 - 18).

As per the above-cited Aoyagi references, Aoyagi states that a refrigerant, such as R-410A and others, has a <u>higher refrigerant density</u> at the same cycle point as R-22, <u>and thus has lower current speed, and the pressure loss is lowered</u> by about 70% <u>when the refrigerant has the same ability as conventional R-22 refrigerant</u>. For this reason the heat transfer coefficient is enhanced in Aoyagi.

As mentioned, Aoyagi teaches to reduce the amount of refrigerant when utilizing a refrigerant like R-410A (see Column 3, lines 44 - 47, and see column 4, lines 16 - 18), so that the R-410A, or other refrigerant that is an HFC or an HC, (all of which have varying typical operating pressures) will have the same ability as conventional R-22, but allegedly with about a 70% lower pressure loss and a lower current speed. The Applicant herein neither teaches nor implies that the refrigerant utilized in a DX system application should have the same ability as conventional R-22. To the contrary, the Applicant teaches that R-410A should be utilized in a DX system because it can operate at higher pressure ranges than conventional R-22 systems, thereby leading to enhanced operational abilities over conventional R-22 (not the same abilities as in Aoyagi's design). A DX system application has multiple differences from an air-source system such as Aoyagi's. For example, a DX system has no de-frost cycle, has no high density finned heat transfer tubing (which typically requires 12-14 fins per linear inch), has no exterior air heat exchanger, operates via exterior conductive heat transfer as opposed to convective heat transfer, has oil lubricant return issues, etc. The density of the refrigerant utilized is irrelevant to the Applicant in a DX system application, as the Applicant is concerned with higher operating pressures than conventional R-22.

Aoyagi further teaches against using refrigerant at operational working pressures greater than those normally used for R-22. Again, Aoyagi teaches that the refrigerant should have the same abilities as R-22. Accordingly, Aoyagi teaches that ,with a greater density refrigerant such as R-410A, a smaller charge of refrigerant should be used so that it operates similar to R-22. The reduced refrigerant charge allows the Aoyagi device to meet its stated objective to avoid pressure loss and decrease current speed within the heat exchange tubing of an air source system in the cooling mode. The reduced charge, however, also reduces the operating pressure of the refrigerant, contrary to Applicant's disclosure. The Applicant's extensive testing has shown that the use of R-410A in a DX system application is advantageous when the R--410A is utilized at a higher operational pressure range than conventional R-22, as disclosed by the Applicant herein. The teachings of Aoyagi have no application to Applicant's disclosures and would be counter-productive. A means of obtaining the same ability of a conventional R-22 system in a DX system is of no value whatsoever to Applicant. Thus, the reasons ascribed by Aoyagi for using R-410A in an air-source heat pump application would neither be relevant, nor advantageous, nor considered by one in a DX system application. Consequently, one of ordinary skill in the art

would not be motivated by the air-source heat pump of Aoyagi to modify a direct expansion geothermal system of Wiggs as proposed in the Office action, and therefore the rejection based on the combination of Wiggs and Aoyagi is improper and must be withdrawn.

CONCLUSION

It is submitted that the present application is in good and proper form for allowance. A favorable action on the part of the Examiner is respectfully solicited. If, in the opinion of the Examiner, a telephone conference would expedite prosecution of the subject application, the Examiner is invited to call the undersigned attorney.

The Patent Office is hereby authorized to credit any overpayment or charge any deficiency in the fees filed, asserted to be filed, or which should have been filed herewith to our Deposit Account No. 50-3629.

Respectfully submitted,
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